

HOW CHINESE LEARNERS OF L2 EUROPEAN PORTUGUESE INTERPRET NULL AND OVERT PRONOUNS IN FORWARD AND BACKWARD ANAPHORA¹

Yi Zheng²

Paula Luegi³

Ana Madeira⁴

Gabriela Matos⁵

ABSTRACT

In a questionnaire study we investigate how native speakers of European Portuguese (EP) and Chinese, as well as Chinese learners of EP as second language (L2), interpret null and overt pronouns in forward and backward anaphora. Results show that EP native speakers exhibit different interpretative biases for null and overt pronominal subjects in both forward and backward anaphora. Chinese native speakers show similar interpretation in backward anaphora in their L1 but a subject preference with both null and overt pronouns in forward anaphora conditions. Chinese learners of L2 EP present an overall preference to interpret both pronouns as referring to the subject referent, although there is a developmental effect towards the target interpretation in overt pronoun backward anaphora conditions. Results confirm previous studies in L2 EP (Madeira et al., 2012; Lobo et al.,

¹ This work was supported by Fundação para a Ciência e a Tecnologia (FCT) with funds attributed to the project UID/LIN/00214/213 and also to the grant SFRH/BPD/84138/2012 awarded to Paula Luegi.

² Universidade de Lisboa, Faculdade de Letras, Centro de Linguística da Universidade de Lisboa, zhengyi1728@hotmail.com.

³ Universidade de Lisboa, Centro de Linguística da Universidade de Lisboa, paularibeiro@campus.ul.pt.

⁴ Centro de Linguística da Universidade Nova de Lisboa/Faculdade de Ciências Sociais e Humanas-Universidade NOVA de Lisboa, ana.madeira@fcs.unl.pt.

⁵ Universidade de Lisboa, Faculdade de Letras, Centro de Linguística da Universidade de Lisboa, gmatos@letras.ulisboa.pt

2017), but add the possibility that this pattern may be explained by L1 influence.

Keywords: anaphora resolution, European Portuguese, Chinese, second language acquisition.

RESUMO

Num estudo de questionário investigamos como os falantes nativos do Português Europeu (PE) e do chinês, bem como os aprendentes chineses que adquirem PE como língua segunda (L2), interpretam pronomes nulos e plenos em condições de anáfora e de catáfora. Os resultados mostram que os falantes nativos de PE exibem diferentes interpretações para sujeitos pronominais nulos e plenos tanto em anáfora como em catáfora. Os falantes nativos de Chinês mostram uma interpretação semelhante em catáfora na sua L1, mas preferem como antecedente o sujeito para pronome nulo e pleno nas condições de anáfora. Os aprendentes chineses de PE L2 preferem interpretar ambos os pronomes como referindo-se a um antecedente sujeito. No entanto, na condição de catáfora com pronome pleno, existe um efeito de desenvolvimento para a interpretação-alvo. Os resultados confirmam os estudos anteriores em PE L2 (Madeira et al. 2012; Lobo et al. 2017) e adicionam a possibilidade de explicar a interpretação na L2 por influência da L1.

Palavras-chave: resolução anafórica, Português Europeu, chinês, aquisição da língua segunda.

1. Introduction

Anaphoric resolution is a topic that has been studied by many researchers both in non-null subject languages, like English (e.g. Reinhart, 1986; Gordon et al., 1993), and in null subject ones, like Italian (e.g., Montalbetti, 1984, 1986; Calabrese, 1986; Carminati, 2002). Romance languages like Italian, Spanish and European Portuguese (EP), labelled as consistent null subject languages by Roberts & Holmberg (2010), generally allow the subject position of a finite root or embedded sentence to be occupied by an empty category, *pro*, which possesses a pronominal nature and is closely related to the rich verbal agreement of this group of languages. It has been widely shown that there is an interpretative bias for the null and overt subjects of the Romance null subject languages (see Calabrese, 1986; Carminati, 2002, for Italian and Costa et al., 1998, 1999; Costa & Matos, 2012, for EP). For example, studies like Costa et al. (1998, 1999) report a bias of interpretation for null and overt pronouns in forward⁶ anaphora structures in EP when two possible antecedents are available in

⁶ In this paper we use as synonyms the terms ‘forward anaphora’ or ‘anaphora’ and ‘backward anaphora’ or ‘cataphora’. Forward anaphora or anaphora are structures in which the referent(s) precedes the anaphora, like

the discourse: the null subject is preferentially interpreted as referring to a subject antecedent, while an overt subject is preferentially interpreted as referring to a non-subject antecedent.

- (1) A mãe_i fotografou a menina quando [-]_i saiu da garagem.
the mum photographed the girl when left from+the garage
'Mum photographed the girl when (she) left from the garage.'
- (2) O menino_i viu o ladrão_j quando ele_j começou a correr.
the boy saw the thief when he started to run
'The boy saw the thief when he started to run.'

(adapted from Lobo & Silva, 2016)

This kind of bias is true for both forward anaphora and backward anaphora, though there may be some differences between the two types of anaphora: for example, according to Lobo & Silva (2016), Lobo et al. (2017) or Rinke and Flores (2018), native speakers of EP show a higher percentage of choice of an object antecedent for the overt pronoun in forward anaphora (85%) than in backward anaphora (61%).

- (3) Quando [-]_i chegou a casa, o avô_i cumprimentou o menino_j.
when arrived to home the grandfather greeted the boy
'When (he) arrived home, the grandfather greeted the boy.'
- (4) Quando ele_j chegou a casa, o menino_i cumprimentou o avô_j.
when he arrived to home the boy greeted the grandfather
'When he arrived home, the boy greeted the grandfather.'

(adapted from Lobo & Silva, 2016)

However, not all of the null subject languages are linked to the verbal agreement. Roberts & Holmberg (2010) consider Chinese, as well as Japanese and Korean, often called 'radical *pro*-

John made a phone call while he was cooking; while backward anaphora or cataphora are structures in which the anaphora precedes its possible referents, like in *While he was cooking, John made a phone call*.

drop languages’, as discourse null subject languages, as their null subject argument is licensed and recovered through discursive information.

Chinese differs from EP concerning the interpretation of null and overt pronouns. While in Chinese it is not only possible but also highly frequent for both a null and an overt subject to be interpreted as referring back to a subject antecedent in forward anaphora structures (Yang, et al., 1999)⁷, in EP, although also possible, the overt-subject interpretation is clearly less frequent. The strong preference of the Chinese overt pronoun in forward anaphora to refer to the subject antecedent may be explained by the fact that the overt pronoun in this language is considered an unstressed pronoun, in the sense of Calabrese (1986), thus it does not usually have the function of a topic-switch marker. On the other hand, in backward anaphora, Chinese exhibits a similar interpretation to EP: null subjects are preferentially interpreted as referring to a subject antecedent, while overt subjects are preferentially interpreted as referring to a non-subject antecedent⁸ (e.g., Lust et al., 1996; Zhao, 2014).

- (5) Zhangsan_i dai zhe yiding maozi, zai [-]_i chui lazhu de shihou.
Zhangsan wear Asp. one hat Prep. blow candle when
‘Zhangsan was wearing a hat, when (he) blew the candle.’

- (6) Zhangsani dai zhe yiding maozi, zai ta_{i/j} chui lazhu de shihou.
Zhangsan wear Asp. one hat Prep. he blow candle when
‘Zhangsan was wearing a hat, when he blew the candle.’

- (7) (zai) [-]_i chui lazhu de shihou, Zhangsan_i dai zhe yiding maozi.
Prep. blow candle when Zhangsan wear Asp. one hat
‘When (he) blew the candle, Zhangsan was wearing a hat.’

⁷ It should be noticed that Chinese also allows disjoint interpretation between the matrix subject and the embedded overt pronoun in forward anaphora structure, though this interpretation is less favored as shown in our preliminary test presented in section 5.1.1.

⁸ Note, however, that, although the bias is similar in forward and backward anaphora in EP, the preference (percentage of choice) is not exactly the same, with a lower preference for overt-object bias in backward anaphora, as mentioned before.

- (8) (zai) Ta_j chui lazhu de shihou, Zhangsan_i dai zhe yiding maozi.
Prep. he blow candle when Zhangsan wear Asp. one hat
'When he blew the candle, Zhangsan was wearing a hat.'

(adapted from Lust et al., 1996)

Thus, the current study aims at investigating if the difference between forward and backward anaphora in Chinese influences Chinese learners of EP as L2 when interpreting null and overt subject pronouns in EP. An off-line questionnaire, which involves temporal adverbial adjunct structures with backward and forward null and overt anaphora, was administered to a group of native speakers of EP and a group of native speakers of Chinese (as a pre-test), as well as to two groups of Chinese learners of EP as L2 (of different proficiency levels: B1 and C1).

In the next section of the paper we make a brief summary of the properties of the two languages, as well as some related L2 acquisition questions. In section 3 we present the objectives of the study and in section 4 the experimental study. In section 5 we describe the analysis and present and discuss the results of our study. Finally, in section 6 we present the conclusions we draw from the results presented in section 5.

2. The background

2.1. Anaphora resolution in Romance null subject languages

It should be noticed that the interpretation preferences attested in EP cannot be explained under the binding principles. In the case of forward anaphora, the pronoun and the matrix subject do not belong to the same local domain, thus their coreference does not violate the principle B of the binding theory.⁹ In backward anaphora in contexts of adverbial clauses, the embedded pronoun does not c-command the matrix subject, thus their coreference does not violate the principle C of the binding theory.

Since pronoun resolution is not restricted by syntactic principles, studies have been conducted as to identify which linguistic and discursive cues impact on the processing and interpretation of

⁹ In the Government and Binding framework, the local domain of an element, also known as governing category, is defined as the minimal NP or clause that contains the element and its governor.

different types of anaphoric expressions, like, for instance null and overt pronominal forms in null subject languages. Since Ariel (1990, 2001) it has been assumed that the form of the anaphoric expression, its informativeness, is related to the accessibility of the antecedent it refers to. Ariel (1990, 2001) proposed that there is an inverse relation between the form of the anaphoric expression and the accessibility of the antecedent: the less informative expressions, like null forms, are used to signal very accessible antecedents, while more informative ones, like full NPs, are used to refer to less accessible antecedents. In line with this reverse relation between form and accessibility (or prominence) of the antecedent that the anaphoric expression refers to, Carminati (2002) proposes the Position of Antecedent Hypothesis (PAH), which posits, for Italian, that, in forward anaphora the antecedent of a null pronoun is preferentially in a more salient position, namely the subject position (SpecIP), while the antecedent of an overt pronoun is preferentially in a non-subject position. PAH predicts that the main factor that determines the anaphoric resolution in Italian is the syntactic position of the antecedent. As for EP, the same correlation between accessibility and syntactic prominence of the preverbal subject has been established by Costa et al. (1998), and identical preferences for the interpretation of null and overt pronominal subjects have been presented in Costa et al. (1998, 1999), Morgado (2012) and Madeira et al. (2012). However, other factors have been identified as impacting on pronoun resolution for different languages as well as for EP, like verbal semantic information (Garvey & Caramazza, 1974; Costa et al., 2004), order of mention (Järvikivi et al., 2005; Luegi, 2012), among others.

For backward anaphora, the interpretation of pronouns may rely on different strategies and different sources of information, as the anaphoric expression precedes its potential antecedent. Kazanina et al. (2007) propose a universal active search mechanism, which claims that the closest nominal expression, considering linear order of presentation, should be considered as the antecedent of a cataphoric expression, as during language processing, once the cataphoric pronoun is encountered by the parser, an active search mechanism is activated and requires the parser to find its antecedent as quickly as possible.¹⁰ Thus, the matrix (preverbal) subject should be the preferred antecedent of the cataphoric expression since it is the closest nominal expression to the pronoun. This proposal was confirmed for English (Kazanina et al., 2007) and for Russian (Kazanina & Philips, 2010).

Concerning Romance null subject languages, the data of Italian from Sorace and Filiaci (2006) and Serratrice (2007) seem to support the PAH, rather than the proposal of active search, since the

¹⁰ According to Kazanina et al (2007), it is the linear order, not the c-command relation, that should be used to determine the shortest distance between two constituents on the processing of backward anaphora.

null pronoun is preferentially interpreted as referring to the subject of the following sentence while the overt pronoun is preferentially interpreted as referring to a non-subject antecedent. Still, although confirming the PAH, a difference between forward and backward anaphora arises in the case of overt pronouns. As shown in Sorace & Filiaci (2006) and Serratrice (2007), an overt pronoun in backward anaphora is preferentially interpreted as referring to an entity which is not mentioned in the utterance, instead of referring to the matrix object, as in forward anaphora.

Concerning EP, Lobo & Silva (2016) and Lobo et al. (2017) also found that the subject antecedent is not the preferred antecedent for the overt pronoun in backward anaphora, but the rate of selection of the subject antecedent was much higher than that in forward anaphora structures. However, the experimental design in these two studies only permits the participants to choose between the matrix subject and the matrix object as the antecedent of the overt pronoun, while, in Sorace & Filiaci (2006) and Serratrice (2007), the participants were allowed to choose between the two matrix arguments plus an extralinguistic entity. In any case, the matrix subject is not the preferred antecedent of the overt pronoun in backward anaphora, contrary to what was shown for English (Kazanina et al., 2007) or Russian (Kazanina & Philips, 2010). Moreover, in the case of null pronouns, there is no difference in EP between forward and backward anaphora, as the null pronoun is always preferentially interpreted as referring to the matrix subject.

2.2. Anaphora resolution in L2 acquisition

The interpretative biases of null and overt pronouns in EP, as well as in other consistent null subject languages, have been widely tested in studies of L2 acquisition. Sorace & Filiaci (2006) proposed the Interface Hypothesis, which claims that the purely syntactic properties are acquirable for near-native L2 learners, while the properties related to the interface between syntax and discourse-pragmatics remain difficult for these learners. White (2011) also claims that this hypothesis should be extended to L2 learners from all levels.

Sorace & Filiaci (2006) show that the near-native speakers of Italian whose L1 is English behaved like the native speakers when interpreting null pronouns, while for overt pronouns they displayed a distinct preference, as they were more likely to choose the subject of the main clause as antecedent in both the forward and backward anaphora contexts. This difference between L2 learners and native speakers in the interpretation of overt pronouns is also confirmed in studies on the L2 acquisition of Spanish (Rothman, 2008, 2009), and EP (Madeira et al, 2012), in the case of forward

anaphora. However, studies like Keating et al. 2011 and Rothman 2009 found that the L2 learners or near-native speakers of Spanish may also display a non-target interpretation for null subjects.

Lobo et al. (2017) make a comparison between forward and backward anaphora in EP, considering also the influence of the L1 of their learners (German and Italian). In general, the L2 learners in the experimental test of Lobo et al. (2017) prefer the subject antecedent for null pronouns and show higher rates of selection of the subject antecedent for overt pronouns than the native controls. However, the Italian learners of L2 EP are more likely to select the non-subject antecedent for overt pronouns than the German learners. They also show faster development when compared with the German learners. As a result, Lobo et al. (2017) concluded that the L1 of the learners could be a key factor in their acquisition of the interpretative properties of pronouns. However, it should be noticed that some studies, such as Margaza and Bel (2006), which investigated Greek learners of L2 Spanish, have reported that L2 learners may still have difficulties in mastering the interpretation of overt pronouns, even if their L1 is similar to the target-language.

2.3. Anaphora resolution in Chinese

Concerning L1 influence, the current study aims to investigate how Chinese learners of L2 EP acquire and interpret the pronouns in forward and backward anaphora in adverbial sentences. As discussed in the introduction, Chinese displays different interpretative preferences in forward and backward anaphora, as compared to Romance null subject languages. Studies on Chinese (Huang, 1982; Lust et al., 1996; Zhao, 2014; a.o.) report, that in forward anaphora, both the null subject and the overt subject tend to refer to the matrix subject, while in backward anaphora, the two anaphoric expressions exhibit different interpretations: the null subject tends to refer to the matrix subject, while the overt one tends to refer to a previously unmentioned entity.

The contrast between forward and backward anaphora in Chinese appears to imply that in Chinese it is the linear order that determines the pronominal interpretation: an overt pronoun may share an identical reference with an NP on its left-hand side, but not on its right-hand side.

To account for the role apparently played by linearity in backward anaphora in Chinese, two types of syntactic analyses have been presented. Huang (1982) proposes the notion of cyclic c-command, which claims that in sentences in which the preposition “*zai*” is not present, as in (8), the overt pronoun in the left-dislocated adverbial adjunct may cyclically c-command the matrix subject,

thus, the coreference between the two constituents violates principle C of the Binding theory and is excluded by the speakers. In (6), on the other hand, as the pronoun is c-commanded by the matrix subject and located in a domain other than that of the matrix subject, their coreference is not ruled out by any principles. This proposal is also adopted in Zhao (2014).¹¹

An alternative explanation was advanced by Lust et al. (1996), who propose that there is a quantifier-raising operation with the overt pronoun in Chinese. In their theory, the overt pronoun in Chinese, *ta*, is in the SpecNP position of NP, which may be occupied by a null head that denotes *pro*. When the overt pronoun is stressed/focused, it acquires quantificational force and raises to the CP domain in LF, from where it c-commands the matrix subject, thus precluding coreference between the two constituents, in the case of backward anaphora. In the case of forward anaphora, the matrix subject at least c-commands the trace of the raised pronoun, thus their coreference is legitimated. In contrast, the null pronominal in Chinese does not have a lexically filled specifier; as a consequence, it does not undergo quantifier raising.

Both proposals analyze the interpretation of overt pronouns in backward anaphora of Chinese in the domain of syntax. This interpretation is also confirmed by a preliminary test of the current study.¹² We aim to investigate whether this property of Chinese influences the acquisition of L2 EP by Chinese learners.

3. Objectives of the study

The main objective of the study is to investigate how Chinese learners of L2 EP interpret null and overt pronouns in forward and backward anaphora in EP, considering the influence from their L1.

Though many of the previous studies (Sorace & Filiaci, 2006; Rothman, 2008; Madeira et al., 2012) have shown that the L2 learners have difficulties in acquiring the interpretative properties of overt subjects in forward anaphoric resolution, not many studies have compared the resolution of forward and backward anaphora with Chinese learners of a null subject language.

¹¹ Zhao (2014) proposes that the null subject in Chinese is not *pro*, but a deleted copy of a zero topic. Thus, in backward anaphora its interpretation is not constrained by cyclic c-command.

¹² However, the preliminary test also indicated that not all of the speakers' interpretations correspond to the syntactic constraints proposed by Huang (1982) or Lust et al. (1996), as nearly 25% of the responses accept the coreferential interpretation. In any case, the preference for the disjoint interpretation is still the dominant option in the backward anaphora structure with overt pronouns.

Though similar to EP in null pronoun resolution,¹³ Chinese differs from EP in the interpretation of the overt pronoun in forward anaphora. However, the two languages are similar again in backward anaphora conditions. If the property of the learners' L1 has an effect on their L2 acquisition, then Chinese L2 learners of EP are predicted to behave differently with overt pronouns in forward and backward anaphora structures.

Moreover, L1 influence may vary depending on the proficiency level of L2 learners, for instance, beginners versus highly proficient learners. Studies like Madeira et al. (2009) and Lobo et al. (2017) have shown that L2 EP learners whose L1 is a Romance null subject language display faster development of the interpretation of pronouns, presenting a native like interpretation since the beginning levels, than learners whose L1 is a Germanic language, who reach native like interpretations only at higher levels of proficiency. Therefore, considering that Chinese exhibits different interpretative preferences for forward and backward anaphora, it is crucial to investigate how the Chinese L2 EP learners interpret null and overt subject pronouns in backward and forward anaphora conditions and also how their development is influenced by their L1, comparing the impact of L1 in different levels of L2 proficiency.

In sum, our research question can be formulated as: Is the resolution of overt and null subject pronouns, in forward and backward anaphora conditions, of Chinese learners' of L2 EP influenced by their L1 preferences? Additionally, we also consider if this influence is similar across different levels of L2 proficiency.

4. The experimental study

We conducted a questionnaire study to investigate our research question. In this study we manipulated the order of presentation of overt and null pronouns, in backward and forward anaphora, and tested different groups of Chinese learners of EP as L2, B1 and C1 levels. We consider that this study will allow us to further understand the process of overt and null pronoun resolution in both forward and backward conditions by Chinese-speaking learners of L2 EP, considering the differences and similarities between EP and Chinese, and to analyze the impact of L1 influence in L2 acquisition. Moreover, we contrast different levels of L2 learners to better understand how language proficiency may influence pronoun resolution in L2 at different levels of proficiency.

¹³ It is possible that there might be some variations in the interpretation of null forms in EP and in Chinese, due to the characteristics of the null categories involved in the two languages, however, this analysis is not the focus of the present study.

In order to clearly control for the impact of L1 influence in our study, since, to our knowledge, no previous study had tested forward and backward anaphora resolution in Chinese native speakers, we also conducted a pre-test with Chinese native speakers living in China. This test was a translation of the EP test.

4.1. Participants

The experimental test of the study was administered to three groups of participants: a group of native speakers of EP, the control group, and two groups of Chinese learners of L2 EP, who act as the experimental groups. One experimental group is composed of learners from the lower intermediate (B1) level, while the other experimental group is composed of learners from the advanced (C1) level. The inclusion of participants at two different proficiency levels allows us to test the development of learners, which is discussed in the next section.

The control group consists of 31 native speakers of EP, who were attending a bachelor's degree at the Faculty of Letters of the University of Lisbon, with an age range from 18 to 24 mean=19 (SD=1.84). The B1 group consists of 21 Chinese learners of L2 EP, who were attending the Portuguese Language and Culture course in the Faculty of Letters of the University of Lisbon, with an age range from 19 to 44, mean=24 (SD=6.42). The C1 group is composed of 23 Chinese learners of L2 EP; some of these were attending the Portuguese Language and Culture course in the University of Coimbra, and some were attending a Portuguese Language course at the Nova School of Business and Economics of University Nova of Lisbon, with an age range from 19 to 22, mean=21 (SD=0.92). All participants gave their informed consent and participated voluntarily in the experiment. Concerning their L2 proficiency, both L2 groups completed a placement test before the start of their course, which determined their L2 EP proficiency level.

4.2. Materials and design

To fulfil the research aims, the experimental test of the study was designed to test four different conditions: forward anaphora with null pronoun; forward anaphora with overt pronoun; backward anaphora with null pronoun and backward anaphora with overt pronoun. Therefore, we manipulated two independent variables, Anaphora Type and Pronoun Type, with two levels each: backward vs. forward anaphora and null vs. overt pronoun, respectively. Each testing condition is exemplified by the sentences in (9).

(9) Condition 1: (Forward overt anaphora)

A Maria apagou a luz enquanto ela comia o bolo.

‘Mary turned off the light while she was eating the cake.’

Condition 2: (Forward null anaphora)

A Maria apagou a luz enquanto [-] comia o bolo.

‘Mary turned off the light while [-] was eating the cake.’

Condition 3: (Backward overt anaphora)

Enquanto ela comia o bolo, a Maria apagou a luz.

‘While she was eating the cake, Mary turned off the light.’

Condition 4: (Backward null anaphora)

Enquanto [-] comia o bolo, a Maria apagou a luz.

‘While [-] was eating the cake, Mary turned off the light.’

As can be seen from the examples, each item consists of a matrix clause plus a temporal adverbial adjunct.¹⁴ Condition 1 yields a forward anaphoric structure, where an overt pronoun occupies the subject position of the subordinate clause. Condition 2 also yields a forward anaphoric structure, with an empty subject in the subordinate clause. Condition 3 yields a backward anaphoric structure, where the adverbial adjunct, with an overt subject pronoun, is left-dislocated. Condition 4 also yields a backward anaphora structure, with an empty subject in the subordinate clause.

In all of the four conditions, the matrix clause contains a subject, which serves as a potential antecedent of the embedded pronoun. The verb of the subordinate clause in all of the four conditions

¹⁴ In our study, only adverbial subordinate clauses, but not coordinated structures, were concerned, and the null or overt pronoun always appears in the subject position of the subordinate clause.

has atelic aspect (process), to ensure that the action occurred in an extendable duration. The verb of the main clause has telic aspect, which guarantees that the action of the main verb can be completely included in the duration of the action described by the subordinate verb.

Twenty-four experimental items, with the structure described above, were distributed by four lists crossing anaphora type and pronoun type according to a Latin Square design: All participants saw all sentences in different conditions. In addition to the experimental sentences, forty-eight filler items were constructed and presented in between the experimental items, in a pseudo-randomized order: Experimental items were always preceded by at least one filler item. Sentences were presented on a booklet with four sentences by page.

4.3. Procedure

Participants were asked to read the sentences and then to respond to a question indicating their interpretation of the embedded pronoun (null or overt), by choosing between two options (an example of question-answer pair is presented in (10)). Each sentence was presented without any previous contextual sentence and was followed by the question and the two possible answers. One of the answer options corresponds to the matrix subject (using always the referred proper name), while the other was always “another person”, literally (that is, no proper name was used, since no entity was mentioned before). The option for “another person” was also included in some filler sentences (see (11), for instance). Moreover, in filler sentences, places or objects that were not mentioned in the discourse were also included, as exemplified in (13). Order of presentation of each option was counter-balanced: left-right, right-left.

(10) A Maria apagou a luz enquanto comia o bolo. ‘Mary turned off the light while was eating the cake.’

Quem é que comia o bolo? ‘Who was eating the cake?’

A. a Maria ‘Mary’ B. *uma outra pessoa* ‘another person’

(11) *Ela saiu muito cedo para ir às compras, embora o marido consiga fazer todas as encomendas pela Internet.* ‘She left very early to go shopping, although her husband can place all the orders online.’

Quem saiu muito cedo? ‘Who left very early?’

A. *o marido* ‘her husband’

B. *uma outra pessoa* ‘another person’

(12) *A Cláudia recebeu um colar de diamantes que pertencia à avó da Luísa.* ‘Cláudia received a diamond necklace which belonged to Luísa’s grandmother.’

O que é que a Cláudia recebeu? ‘What did Cláudia receive?’

A. *um anel* ‘a ring’

B. *um colar* ‘a necklace’

It is worth noting that the design of this study is different from that of Lobo and Silva (2016) and of Lobo et al. (2017). Firstly, in our study only one referent was mentioned, since only a single sentence, with just one referent, was presented, while in the referred studies there were always two referents; secondly, while in those two studies, participants were not allowed to choose an antecedent which was not referred in the utterance as a possible answer to the question, in our study this possibility was included.

Studies like Ariel (1990) have argued that, even in structures which strongly imply a cataphoric interpretation, the speakers still maintain a possibility to interpret them as a forward anaphoric structure. That is to say, they may always consider that there is a possibility that the apparent cataphoric expression takes as its antecedent an expression mentioned in the previous discourse or an extra-discursive entity, that is, a referent not mentioned in the discourse. Considering this question, we included “another person” as a possible answer for the question so that participants could choose between a referent mentioned in the sentence, the matrix subject, and an unmentioned one.

In this study we opted for sentences with just one referent because these sentences allow us to distinguish syntactic function from discursive effects in pronoun resolution, considering the characterization of the two languages involved in this study: EP, a consistent null subject language, and Chinese, a discourse null subject one (or radical pro/topic drop). While it is expected that in EP pronoun resolution is solved based on the syntactic function of the referents, subject versus non-subject, in Chinese, pronoun resolution, that is, antecedent interpretation will rely more on discursive information, referred versus non-referred referents. Specifically, we expect that while in EP the null will be interpreted preferentially as referring back to the subject antecedent and the overt to the non-

subject one (being it referred or not in the discourse, see, for instance, Carminati (2002), for similar results in Italian), in Chinese we expect that both the null and the overt pronoun will be preferentially interpreted as referring to the only referred antecedent in the discourse. Since strategies for pronoun resolution seem to differ in the two tested languages and considering that these different strategies might be enhanced/emphasized in sentences with just one referent, due to discursive restrictions, we decided to test sentences with just one referent.

The questionnaire was presented in a paper booklet and completed in class (in the case of the Chinese learners, it was completed during their Portuguese lesson). Participants were instructed to carefully read the instruction of the test, presented on the first page, and then to fill in their personal information as gender, age, knowledge of foreign languages and also information about EP proficiency, use and knowledge. All of the sentences, as well as the questions and options, were presented afterwards.

An equivalent Chinese version of the test was also administered to a group of native speakers of Chinese, in China, to test how they interpret the null and overt pronouns in their L1. This test serves as the preliminary test of the study and contains the same four conditions tested in the Portuguese test. Twenty-four native speakers of Chinese participated in this experiment. All participants had a university education and their age range was from 24 years old to 40 years old ($M=31$; $SD=4.06$).

5. Analysis and discussion of the results

5.1. Results

For the analysis of the data we implemented a Linear Mixed Model (LMM) with *lme4* package (Bates, Maechler, Bolker, & Walker, 2015) in R (R Development Core Team, 2008). Since our dependent variable is binomial we fitted a mixed logit regression model using *glmer* with “logit” link function (Jaeger, 2008). We included in the model all main effects and interactions. Our design included the following main effects: Anaphoric expression (anaphora vs. cataphora), Pronoun (null vs. overt), Group (EP native speakers, B1-EP-learners, C1-EP-learners). We also included items and participants as random intercepts as well as by-item and by-participants slopes for all main effects. All independent variables were centered to avoid collinearity effects (Jaeger, 2008; Field, Miles, & Field, 2012).

5.1.1. Chinese Pre-test

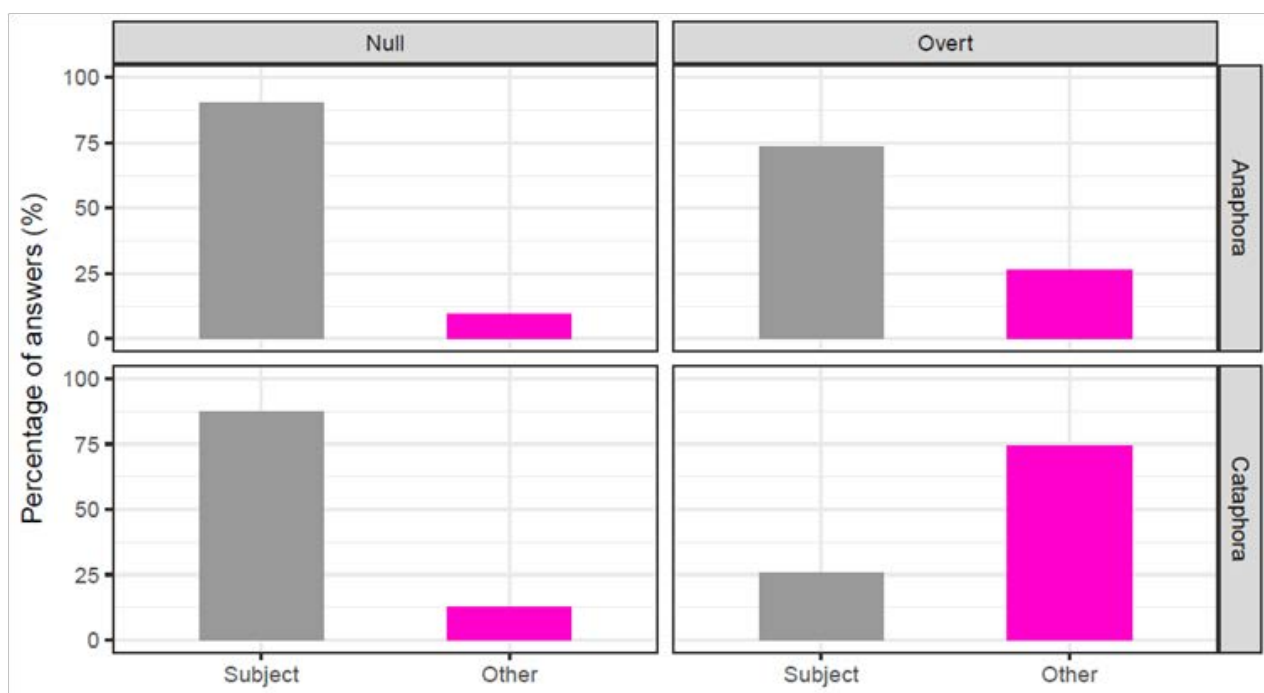
5.1.1.1 Results

In Table 1 we present the LMM effects for the Chinese pre-test and in Graphic 1 we present the general percentages of answers. As can be seen, there is a main effect of anaphoric expression, pronoun and also an interaction between these two variables. The main effect of anaphoric expression reveals a preference to interpret the subject as the antecedent of null and overt pronouns in anaphora conditions (59%) when compared to cataphora conditions (51%). The main effect of pronoun reflects a preference to interpret the null pronoun as referring to the subject antecedent (64%) when compared to the overt pronoun (36%). Effect of interaction of anaphoric expression and pronoun, revealing a difference in the preference to choose the subject as the antecedent in the anaphora and cataphora conditions; moreover, this preference is different for overt and null pronouns, especially in cataphora conditions: more subjects with null than with overt.

Table 1: LMM effects of Chinese pre-test.¹⁵

	Estimate	Std.Error	z-value	Pr(> z)
(Intercept)	-1.881	0.52	-3.64	0.001
Anaphoric Expression	3.495	1.01	3.47	<0.001
Pronoun	4.574	1.03	4.45	<0.001
Anaphoric Expression X Pronoun	2.141	0.95	2.26	0.024

Graphic 1: Results of the Chinese pre-test



¹⁵ Statistically significant results are always presented in bold face.

5.1.1.2. Discussion

The results of the preliminary test show that the native speakers of Chinese prefer the subject antecedent for the null subject in both the forward and backward anaphora structures, obtaining acceptance percentages of 90.3% and 87.5% respectively. For overt pronouns, they also chose the subject antecedent 73.6% of the times when interpreting forward anaphora structures. However, for overt pronouns in backward anaphora, they only chose the subject antecedent 25.7% of the times. It seems that the native speakers of Chinese exhibit distinct interpretations for forward and backward anaphora with respect to the overt pronoun. It should be noticed that the strong preference for the non-subject antecedent for overt pronouns in backward anaphora may not be constrained by syntactic factors, as suggested by Huang (1982) or Lust et al. (1996), as there were still 25.7% of the responses favoring the coreferential reading between the matrix subject and the overt pronoun in this condition. In any case, the preference for non-subject antecedent in this condition in Chinese was confirmed by the preliminary test. Overall, our results show that, while there is a general preference to interpret both null and overt pronouns in anaphora condition as referring back to the subject of the preceding sentence, in cataphora conditions the preference to interpret the null pronoun as referring to the subject of the following sentence is maintained but the preference for overt pronoun is reversed: participants prefer to interpret the overt pronoun as referring to an extra-discursive referent.

As referred previously, since this is not the focus of our study, we will not discuss the results of this experiment further. We believe that further research, both in the domain of linguistic theory and psycholinguistics, based on empirical studies, is needed to better explain the behavior of Chinese speakers regarding resolution of null and overt pronouns in both anaphora and cataphora conditions. Two aspects are particularly relevant. First, as a null subject language, Chinese does not show the usually described pattern of division of labor between null and overt pronouns in forward anaphora. However, we consider that this behavior may be due to the design of our experimental task, since only one referent was presented, and, therefore, participants preferred to interpret the anaphoric pronouns forms as referring to the only discursive explicit referent. This can be explained by the fact that Chinese is considered as a discourse-oriented language and, as discussed previously, coreference in anaphora conditions is determined, mainly, by discursive factors. The second aspect that deserves further and dedicated research is the difference between anaphora and cataphora conditions. Results from cataphora conditions do not reflect the pattern of anaphora conditions. In cataphora conditions with only one referent in the following sentence, null pronouns are interpreted as referring to the subject, while overt pronouns are interpreted as referring to some other entity, not referred in the

discourse. This result does not reflect the strategies adopted for pronoun resolution in forward anaphora conditions. It reflects, however, the strategies adopted by consistent null subject languages in cataphora conditions (see Lobo & Silva, 2016, for instance). Clearly, the factors that determine overt and null pronoun resolution in anaphora and cataphora conditions in Chinese are not the same; however, further research is needed to explore these differences in greater depth, namely with conditions which present more than one referent in the sentence, as has been done in similar studies.

5.1.2. EP test

We start this section by presenting some descriptive statistics about the characteristics of our samples considering the short questionnaire about language knowledge and use participants completed at the beginning of the experimental session. As can be seen in Table 2, both groups are quite similar although the mean time of EP language learning is higher in C1 group (with a range from 1 year to 3 years of learning) than in the B1 group (which as a range from 0, that is, less than 12 months, to 7¹⁶ years of learning). In what concerns their length of residence in Portugal, values are quite similar, although a bit higher in the B1 group which as a range from 1 year to 6 years of residence in Portugal. C1 Group has a lower range, with a variation between 1 and 2 years of residence in Portugal. Most of participants of both groups use EP regularly on a daily base when compared to use at least twice a week (B1: 19/21 vs. 2/21; C1: 19/22 vs. 3/22¹⁷). None reported to use EP “at least once a month” or even “rarely”.

Table 2: L2 learners characteristics.

B1 (n=21)	Time (in years) of learning (SD)	1.75 (1.71)
	Time (in years) since arrival (SD)	1.67 (1.28)
	Daily contact	90.00%
	Contact at least 2 times per week	10.00%
	Languages the learner was exposed to before 6 years old	48% none; 52% Engl.
	Other known languages	62% none; 38% Engl.; 5% other ¹⁸

¹⁶ We looked at data from this participant (which arrived in Portugal 1 year ago) and from one other that started to learn EP 5 years ago and was in Portugal for the last 6 years and their answers are similar to the ones from other participants in the group. We also run the analysis with and without the data of these participants and results were the same in the statistical models with and without them, therefore we decided to keep these participants in the analysis.

¹⁷ Not all participants in this group gave this information.

¹⁸ This other, reported only by one participants, refers to Korean.

C1 (n=23)	Time (in years) of learning (SD)	2.32 (0.57)
	Time (in years) since arrival (SD)	1.15 (0.37)
	Daily contact	86%
	Contact at least 2 times per week	14%
	Languages the learner was exposed to before 6 years old ¹⁹	55% none; 45% Engl.
	Other known languages ²⁰	41% none; 55% Engl.; 18% other ²¹

In Table 3 we present descriptive statistics for all the groups. We opted to include the results from the Chinese group to allow for a comparison between learners and their native L1 group although the results are not directly comparable since the test applied to the Chinese native speaker group was a translation of the sentences used in the EP test, that is, it is not the same experiment. This table allows for the comparison of the variability between the different groups in what concerns the subject choice (Minimum, Maximum, Mean, Standard Deviation and Subject choice over 50%).

Table 3: Descriptive statistics of subject preferences in all conditions and all groups. Native Chinese group is in gray since results are from the similar test in Chinese, not in EP.

		EP (n=31)	C1 (n=23)	B1 (n=21)	Native Chinese (n=24)
Null	Min-Max	50%-100%	50%-100%	83%-100%	50%-100%
	Anaph Mean (SD)	98% (9)	93% (14)	97% (7)	90% (15)
	Choice over 50%	97% (30/31)	96% (22/23)	100% (21/21)	96% (23/24)
	Min-Max	17%-100%	0%-100%	17%-100%	50%-100%
	Cataph Mean (SD)	94% (18)	72% (32)	84% (22)	88% (17)
	Choice over 50%	94% (29/31)	74% (17/23)	86% (18/21)	92% (22/24)
Overt	Min-Max	0%-100%	0%-100%	0%-100%	33%-100%
	Anaph Mean (SD)	36% (35)	66% (37)	87% (24)	74% (25)
	Choice over 50%	29% (9/31)	70% (16/23)	90% (19/21)	71% (17/24)
	Min-Max	0%-100%	0%-100%	0%-100%	0%-83%
	Cataph Mean (SD)	30% (32)	29% (33)	48% (38)	26% (28)
	Choice over 50%	26% (8/31)	22% (5/23)	43% (9/21)	13% (3/24)

¹⁹ In the EP group the results were: 45%, none (no other language), 52%, English, and 7% spoke other languages (French and Dutch, some of them spoken by the same participant).

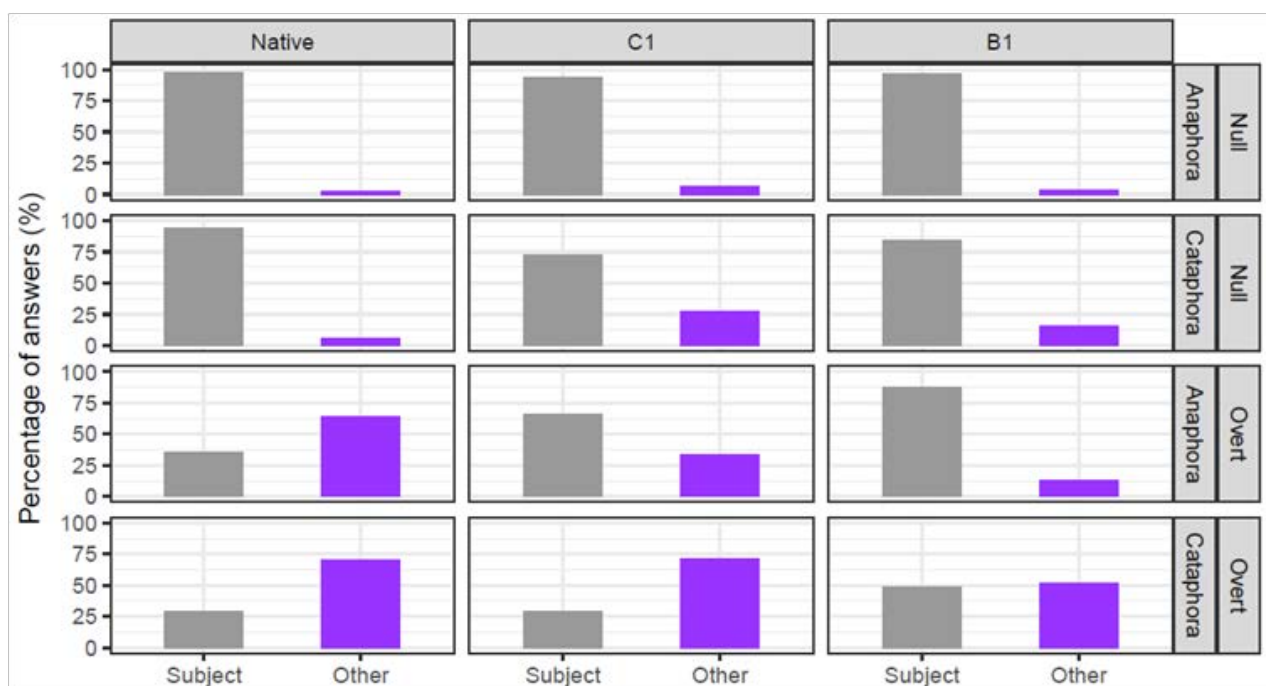
²⁰ In the EP group the results were: 28%, none (no other language), 45%, English, and 48% spoke other languages (French, German and Spanish).

²¹ This includes Korean, Japanese, Russian and French. Some of them spoken by the same participant.

This table allows for the direct comparison between groups and is especially helpful for the interpretation of statistical results. The results show that the great difference is in the anaphora condition with overt pronoun when comparing EP with the other three groups and in the B1 group, in overt cataphora condition, when compared with any other group, but especially with C1 and with EP native speakers.

In Graphic 2 we present the general results of the EP test, including choice percentages of the control group and the two learner groups.

Graphic 2: General results of the EP test.



In the next sections we present the results for the EP group and also for the contrast for each pair of groups.

5.1.2.1. Native EP

In Table 4 we present the LMM effects for the control group of the EP test. As can be seen, there is only main effect of pronoun, which means that they show a higher choice for the subject antecedent in null pronoun conditions (75%) than in overt pronoun conditions (25%). However, there is no main effect of anaphoric expression, nor interaction between the pronoun and anaphoric expression. The results of the native EP group reveal that in this language, concerning the structure tested in our study,

the native speakers clearly prefer subject antecedents for the null pronoun, regardless of whether it is forward or backward anaphora, while they prefer the non-subject antecedent for the overt pronoun, in both forward and backward anaphora structures.

Table 4: LMM effects of Portuguese L1 speakers.

	Estimate	Std.Error	z-value	Pr(> z)
(Intercept)	-4.2363	1.4278	-2.967	0.003
Anaphoric Expression	1.2098	0.8350	1.449	0.147
Pronoun	11.9107	2.8809	4.134	<0.001
Anaphoric Expression X Pronoun	-0.4399	1.3753	-0.320	0.749

5.1.2.2. EP as L2

In this section, we report results contrasting B1 with C1 and, afterwards, each learner level group, B1 and C1, with EP native speakers.

5.1.2.3. B1 vs. C1

As can be seen in Table 5, there is a main effect of anaphoric expression, of pronoun and of group. There is also an interaction of anaphoric expression and pronoun. Overall there is a preference, in the two groups, to choose more subject answers in anaphora conditions (86%) when compared to cataphora ones (58%). Pronoun effect reflects a preference to interpret the subject as the antecedent of the null pronoun (87%) when compared to the overt pronoun (58%). Moreover, there is a group effect that reflects a subject preference higher in the B1 group (79%) than in the C1 group (65%). Overall, B1 learners show a subject preference in all conditions except for the overt pronoun in cataphora conditions, in which choice is at chance level. The interaction effect between anaphoric expression and pronoun indicates that there are more subject choices in anaphora with null (95%) than in cataphora with overt (39%).

Table 5: LMM results of B1 versus C1.

	Estimate	Std.Error	z-value	Pr(> z)
(Intercept)	-2.180	0.46	-4.79	0.001
Anaphoric Expression	3.349	0.69	4.84	<0.001
Pronoun	2.662	0.72	3.70	<0.001
Group	1.835	0.82	2.23	0.026
Anaphoric Expression X Pronoun	1.706	0.69	2.46	0.014
Anaphoric Expression X Group	-0.388	1.18	-0.33	0.743
Pronoun X Group	2.060	1.41	1.46	0.145
Anaphoric Expr. X Pronoun X Group	-0.321	1.35	-0.24	0.812

5.1.2.4. B1 vs. EP

As can be seen in Table 6, there is a main effect of anaphoric expression, of pronoun, an interaction of anaphoric expression and pronoun and also an interaction of pronoun and group. Overall there is a preference, in the two groups, to choose more subject answers in anaphora conditions (80%) when compared to cataphora ones (64%). Pronoun effect reflects a preference to interpret the subject as the antecedent of the null pronoun (93%) when compared to the overt pronoun (50%). The interaction between anaphoric expression and group indicates that there are more subject choices in anaphora conditions in the B1 group (92%) than in the anaphora condition in the EP group (67%). The interaction between pronoun and group is a result of less subject choices with the overt pronoun in the EP native speakers' group (33%) when compared to the B1 group (68%). Overall, the B1 group prefers to interpret the subject as the antecedent of both the null and the overt pronouns in all conditions, except in the overt cataphora condition, in which the preference for subject or other is at chance level.

Table 6: LMM results of B1 versus EP.

	Estimate	Std.Error	z-value	Pr(> z)
(Intercept)	-3.058	0.59	-5.19	<0.001
Anaphoric Expression	2.037	0.60	3.42	<0.001
Pronoun	6.226	1.00	6.20	<0.001
Group	0.202	0.99	0.20	0.839
Anaphoric Expression X Pronoun	0.384	0.90	0.43	0.670
Anaphoric Expression X Group	-2.433	1.11	-2.19	0.029
Pronoun X Group	7.912	1.98	4.00	<0.001
Anaphoric Expr. X Pronoun X Group	-2.241	1.67	-1.34	0.179

5.1.2.5. C1 vs. EP

As can be seen in Table 7, there is a main effect of anaphoric expression and of pronoun and also two interactions: Anaphoric expression X Group and Pronoun X Group. The main effect of anaphoric expression reflects a preference for subject choice in anaphora conditions (73%) when compared to cataphora structures (56%). The main effect of pronoun reveals a preference of subject choice with the null pronoun (90%) when compared to the overt pronoun (40%). The interaction of anaphoric expression and group reflects less subject choices in anaphora condition for the EP group (52%) compared to the C1 (61%), and the interaction of pronoun and group reflects a higher subject choice with null pronoun in the EP group (75%) than in the C1 group (64%).

Table 7: LMM results of C1 versus EP.

	Estimate	Std.Error	z-value	Pr(> z)
(Intercept)	-1.542	0.33	-4.74	<0.001
Anaphoric Expression	1.263	0.40	3.13	0.002
Pronoun	4.741	0.32	14.69	<0.001
Group	-0.541	0.53	-1.02	0.306
Anaphoric Expression X Pronoun	0.570	0.65	0.88	0.378
Anaphoric Expression X Group	-1.710	0.69	-2.47	0.013
Pronoun X Group	3.299	0.52	6.32	<0.001
Anaphoric Expr. X Pronoun X Group	0.123	1.04	0.12	0.906

5.2. Discussion

Firstly, we would like to start with the data of the EP control group. There is only a main effect of pronoun, as the native speakers clearly prefer the subject antecedent for null pronouns, and the non-subject antecedent for overt pronouns, no matter what kind of anaphoric expression is involved. As suggested by the statistical analyses, there is neither main effect on expression, nor interaction between pronoun and expression. Thus, considering the data of this study, it appears that anaphoric resolution in EP (at least for the structures investigated in this study) is linked to the form of the anaphoric expression, but not to the position of the anaphoric expression.

It should be noticed that in some other studies the native speakers of EP are more likely to accept the subject antecedent in the backward anaphora overt condition than in the forward anaphora overt condition (see Lobo and Silva, 2016; and Lobo et al., 2017), although showing the same interpretation bias of the two forms (null-subject, overt-object, however with lower percentages in the latter). However, just as we discussed in section 4.3, our test is different from those tests applied in Lobo & Silva (2016) and Lobo et al. (2017), in which participants were allowed to choose the antecedent of the pronouns between the matrix subject and matrix object. As a result, it should be reasonable that there is some difference on the results of our study and other studies, since different experimental designs (stimuli and paradigms) were applied.

Considering the results from the group of B1 level learners, it has been found that they do not show many differences, when compared to the native speakers, in the null pronoun conditions, as they prefer to choose the subject antecedent in both the forward null anaphora and the backward overt anaphora conditions. These results confirm that the interpretation of the null pronoun is not problematic in L2 acquisition when the L1 is a null subject language.

However, for the condition of forward overt anaphora, the B1 learners differ significantly from the native speakers of EP, as they prefer to interpret the matrix subject as the antecedent of the embedded overt pronoun, which is in contrast to the interpretation of the EP native speakers. There are two ways to explain this phenomenon: on the one hand, there may be some L1 influence on the B1 learners, as in their L1 there is also preference to interpret the subject as the antecedent of the overt pronoun in these structures; on the other hand, previous studies (e.g. Margaza & Bel, 2006) have shown that L2 learners may always prefer the subject antecedent for overt pronouns, no matter what kind of L1 they speak, especially for the learners from lower proficient levels.

The most striking part of the results comes from the backward overt anaphora condition, as the B1 learners did not show any preference for subject or extra-discursive antecedents. This interpretation is not only different from that of the target language (EP), but also distinct from their native language. Actually, in this condition, EP and Chinese native speakers interpret the overt pronoun in their L1 preferentially as referring to an extra-discursive referent. Looking into the individual results, it has been found that there is a major variation inside this group, as 6 of the 21 B1 participants show a clear preference for the non-subject antecedent (over 83% of acceptance), while 8 of them show a clear preference for the subject antecedent (over 83% of acceptance). The rest of the participants show a chance-level interpretation. We will return to this point after presenting the discussion of the C1 group.

The C1 learners, like the B1 learners, also prefer subject antecedents in both the forward and backward anaphora conditions, when interpreting the null pronouns. However, for the overt pronoun conditions, they behave differently with respect to forward and backward anaphora. In the forward anaphora condition, they also prefer the matrix subject as the antecedent of the overt pronoun, which is similar to the interpretation of the B1 learners. In the backward anaphora condition, however, they prefer the non-referred entity as the antecedent of the overt pronoun.

Overall, the findings of the test confirm the following facts. First, learners from the two levels do not experience difficulties in their interpretation of null pronouns in EP, either in forward or in backward anaphora. This shows that the interpretation of null pronouns is not problematic in L2 acquisition at least when the L1 is a null subject language.

Results also show that the learners behave differently in the interpretation of overt pronouns in forward anaphora. This difference has been found in various previous studies, so it is not a surprising

result that the Chinese learners from both B1 and C1 levels prefer the matrix subject as the antecedent of the overt pronoun, which contrasts with the judgements of the native speakers. The interpretation of the Chinese learners may also be explained by the fact that their L1 also prefers the matrix subject in these structures.

The most interesting part are the results of the condition of overt pronoun in backward anaphora structures. The B1 learners do not perform as consistently as the C1 learners in the backward overt anaphora condition, as some of them display a target interpretation, while others do not. However, C1 learners already exhibit a clear preference for the non-subject antecedent, which is similar to that shown by the native EP speakers.

The research question of the study is whether the L2 learners' null and overt pronoun interpretation, as well as their pace of development, is influenced by their L1, which is answered in the following way. For the forward anaphora structure with overt pronouns, both the B1 and C1 learners showed non-target interpretation compared to the native speakers, and no development was attested from B1 to C1 level. However, for the backward anaphora structure with overt pronouns, only some of the B1 learners maintained a non-target interpretation, while other B1 learners and most of the C1 learners already interpret the overt pronoun in the same way as the native speakers do. As a result, some of the learners show a different pace of development regarding different structures. Hence the developmental differences between forward and backward anaphora may be caused by L1 influence.

As discussed in the background, Chinese and EP display different interpretations in the forward anaphora with overt pronouns condition. However, they are identical in the case of backward anaphora with overt pronouns condition. As a consequence, the differences regarding the L2 development between forward and backward anaphora attested in the experiment may be a direct cause of the similarities and differences between the two languages.

In fact, a similar phenomenon is also tested in studies like Madeira et al. (2009) and Lobo et al. (2017). In these studies, two groups of L2 learners of EP were compared, which performed in different ways concerning their development. Both the studies compared L2 learners whose L1 is a Germanic language (lacking referential null subjects) and a Romance null subject language. In both of these studies, it was found that L2 learners of both groups from the initial levels show difficulties in interpreting the overt pronouns in EP. However, it was the L1 Romance language group, but not the L1 Germanic language group, that showed quicker and earlier development from the lower to

the higher levels. Thus, the authors of these two studies concluded that there was L1 influence which determined the differences regarding the pace of development between the Romance and Germanic groups.

As a result, it should be concluded that the L1 helped some of the B1 and most of the C1 Chinese learners in our study to develop a similar interpretation to the native speakers in the backward anaphora overt condition. However, for the forward anaphora condition, no such development has been found due to the fact that the L1 Chinese differs from the target language in this condition.

6. Conclusions

The current study, an off-line questionnaire task, aimed to test how two groups of Chinese B1- and C1-level learners of L2 EP interpret null and overt subject pronouns in EP and compare the conditions of forward and backward anaphora, considering the influence from their L1. The experimental test of the study provided the following findings.

Firstly, the study demonstrates that, in EP, the native speakers show a clear interpretative bias for the null and overt pronouns, regardless of whether forward or backward anaphora is concerned. They prefer to interpret a null pronoun as referring to a subject antecedent, while interpreting the overt pronoun as referring to a non-referred antecedent in both kinds of anaphora.

Secondly, like other previous studies, the current study also demonstrates that the L2 learners do not show much difficulty in acquiring the interpretative properties of the null pronouns, as the learners at both intermediate and advanced proficiency levels tend to accept a subject antecedent for the null pronouns of EP, and there is no difference between forward and backward anaphora.

However, results from the current study show that the L2 learners display some non-target behaviors regarding the interpretation of overt pronouns, in both forward and backward anaphora. The differences appear to be more apparent in the forward anaphora condition than in the backward anaphora condition. In the former case, learners from both levels prefer the subject antecedent and there is no improvement from the B1 to the C1 level. In the latter case, only some of the B1 learners show a non-target interpretation, while others already have a target interpretation, and the C1 learners already exhibit a native-like interpretation in the cataphora-overt condition. The different developmental route for forward and backward anaphora can be explained by L1 influence, as, in Chinese, native speakers also prefer a non-subject antecedent in the backward overt anaphora condition, while in the forward

anaphora condition, they prefer the subject antecedent for overt pronouns.

As a result, these findings indicate that, in L2 acquisition, L1 influence may play an important role in the learners' development of anaphoric interpretation. Even with similar structures, the differences found in L1 may result in a different pace of development in their L2 acquisition.

As a final note, we would like to consider some limitations of our study that may have influenced the results. In this study, contrary to similar studies, we analyzed structures with only one referent which may have influenced both the interpretation of L1 speakers and of L2 learners. Therefore, we aim at conducting further studies not only with structures with two referents but also to develop studies with on-line paradigms which will allow us to better and more directly detect unconscious (less controlled) resolution of both null and overt pronouns.

REFERENCES

ARIEL, M. Accessing noun-phrase antecedents. London: Routledge, 1990.

ARIEL, M. Accessibility theory: an overview. In: SANDERS, T.; SCHILPEROORD, J. & W. (eds.). Text representation: linguistic and psycholinguistic aspects. Amsterdam: John Benjamins, 2001.

BATES, D.; MAECHLER, M.; BOLKER, B.; WALKER, S. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1-48, 2015. DOI: 10.18637/jss.v067.i01

CALABRESE, A. Pronomina: some properties of the Italian pronominal system. Cambridge, Massachusetts: MIT working papers in Theoretical Linguistics, vol 8, p.1-46, 1986.

CARMINATI, M. N. The processing of Italian subject pronouns. PhD dissertation, University of Massachusetts at Amherst, Amherst (Ma): GLSA Publications, 2002.

COSTA, A., FARIA, I.; MATOS, G.. Ambiguidade referencial na identificação do sujeito em estruturas coordenadas. In: MOTA, M. A.; MARQUILHAS, R. (orgs.) *Actas do XIII Encontro Nacional da Associação Portuguesa de Linguística*. Lisboa: Associação Portuguesa de Linguística, 1998, p. 173-188.

COSTA, A.; FARIA, I.; MATOS, G. Competitive information sources in referential ambiguity resolution. In: PINTO, M^a da Graça; VELOSO, J.; MAIA, B. (orgs.) Psycholinguistics on the Threshold of the Year 2000 — Proceedings of 5th International Congress of the International Society of Applied Psycholinguistics (ISAPL 97). Porto: Faculdade de Letras da Universidade do Porto, 1999, p. 133-138.

COSTA, M. A.; FARIA, I. H.; KAIL, M. Semantic and syntactic cues' interaction on pronoun resolution in European Portuguese. In: BRANCO, A.; MCENERY, T.; MITKOV, R. (Eds), DAARC 2004, 5th Discourse Anaphora Resolution Colloquium. Proceedings. Lisbon: Ed. Colibri, 2004, p. 45-50.

COSTA, A.; MATOS, G. Processamento da correferência e sujeitos anafóricos – dados sobre o Português Europeu e Brasileiro. *Revista Linguística - Correferência anafórica: representação, aquisição e processamento*, vol. 8, n.2., p. 289-323, 2012.

FIELD, A.; MILES, J.; FIELD, Z. *Discovering Statistics Using R*. SAGE Publications, 2012.

GARVEY, C.; CARAMAZZA, A. Implicit Causality in Verbs. *Linguistic Inquiry*, 5(3), 459-464, 1974.

GORDON, P.; GROSZ, B.; GILLIOM, L. Pronouns, names, and the centering of attention in discourse. *Cognitive Science*, 17, p. 311–347, 1993.

HUANG, C. -T. J. Logical relations in Chinese and the theory of grammar. PhD dissertation, MIT, 1982.

JAEGER, T. F. Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of Memory and Language*, 59(4), p. 434–446, 2008. DOI: 10.1016/j.jml.2007.11.007

JÄRVIKIVI, J.; VAN GOMPEL, R. P. G.; HYÖNÄ, J.; BERTRAM, R. Ambiguous pronoun resolution: Contrasting the first-mention and subject preference accounts. *Psychological Science*, 16, p. 260–264, 2005. DOI:10.1111/j.0956-7976.2005.01525.x

KAZANINA, N.; LAU, E.; LIEBERMAN, M.; YOSHIDA, M.; PHILLIPS, C. The effect of syntactic constraints on the processing of backwards anaphora. *Journal of Memory and Language*, v56, n3, p. 384-409, 2007.

KAZANINA, N.; PHILLIPS, C. Differential effects of constraints in the processing of Russian cataphora. *The Quarterly Journal of Experimental Psychology*, 63 (2), p. 371-400, 2010.

KEATING, G.; VANPATTEN, B.; JEGERSKI, J. Who was walking on the beach? Anaphora resolution in Spanish heritage speakers and adult second language learners. *Studies in Second Language Acquisition*, 33, p. 193-221, 2011.

LOBO, M.; SILVA, C. Ambiguidade pronominal em orações adverbiais do português europeu: crianças vs. adultos. *Revista da Associação Portuguesa de Linguística* 2, p. 319-338, 2016.

LOBO, M.; MADEIRA, A.; SILVA, C. Interpretação de pronomes sujeito anafóricos e catafóricos por falantes de português L2: efeitos da língua materna. *Revista da Associação Portuguesa de Linguística* 3, p. 135-153, 2017.

LUEGI, P. Processamento de sujeitos pronominais em Português: efeito da posição estrutural dos antecedentes. Universidade de Lisboa, PhD dissertation, 2012.

LUST, B.; CHIEN, Y.; CHIANG, C.; EISELE, J. Chinese Pronominals in Universal Grammar: A Study of Linear Precedence and Command in Chinese and English Children's First Language Acquisition. *Journal of East Asian Linguistics*. vol. 5, n. 1, p. 1-47, jan., 1996.

MADEIRA, A.; XAVIER, M. F.; CRISPIM, M. L. A aquisição de sujeitos nulos em português L2. *Estudos da Língua(gem) (Pesquisas em Aquisição da Linguagem)* 7(2), p. 163-198, 2009.

MADEIRA, A.; XAVIER, M. F.; CRISPIM, M. L. Uso e interpretação de sujeitos pronominais em português L2. In: COSTA, A.; FLORES, C.; ALEXANDRE, N. (orgs.) *Textos Seleccionados do XXVII Encontro da Associação Portuguesa de Linguística*. Lisboa: Associação Portuguesa de Linguística, 2012, p. 376-397.

MARGAZA, Panagiota; BEL, Aurora. Null subjects at the syntax-pragmatics interface:

evidence from Spanish interlanguage of Greek speakers. In: O'BRIEN, M. Grantham; SHEA, C.; ARCHIBALD, J. (Eds.) *Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006)*. Somerville, MA: Cascadilla Proceedings Project, 2006, p. 88-97.

MONTALBETTI, M. *After Binding- On the interpretation of pronouns*. PhD Dissertation. MIT. Cambridge, Massachusetts, 1984.

MONTALBETTI, M. How pro is it? In: JAEGGLI, O.; SILVA-CORVALAN, C. (eds) *Studies in Romance Linguistics*. Dordrecht: Foris Publications, 1986, p.137-165.

MORGADO, S. *Processamento da co-referência pronominal: informação sintáctica e semântica*. Tese de Mestrado apresentada à Faculdade de Letras da Universidade de Lisboa, 2012.

REINHART, T. Center and periphery in the grammar of anaphora. In: LUST, B. (ed.) *Studies in the acquisition of Anaphora*. Vol. I. D. Reidel Publishing Company. 1986, p. 123-150.

RINKE, E.; FLORES, C. Another look at the interpretation of overt and null pronominal subjects in bilingual language acquisition: Heritage Portuguese in contact with German and Spanish. *Glossa: a journal of general linguistics*, 3 (1), p. 68, 2018.

ROBERTS, I.; HOLMBERG, A. Introduction: parameters in minimalist theory. In: BIBERAUER, T.; HOLMBERG, A.; ROBERTS, I.; SHEEHAN, M. (Eds.). *Parametric Variation: Null Subjects in Minimalist Theory*. Cambridge: Cambridge University Press, 2010, p. 1-57.

ROTHMAN, J. How Pragmatically Odd!: Interface Delays and Pronominal Subject Distribution in the L2 Spanish of English Natives. *Studies in Hispanic and Lusophone Linguistics*, 1, p. 317-339, 2008.

ROTHMAN, J. Pragmatic deficits with syntactic consequences?: L2 pronominal subjects and the syntax-pragmatics interface. *Journal of Pragmatics* 41(5), p. 951-973, 2009.

SERRATRICE, L. Cross-linguistic influence in the interpretation of anaphoric and cataphoric pronouns in English–Italian bilingual children. *Bilingualism: Language and Cognition* 10 (3),

2007, p. 225–238, 2007.

SORACE, A.; FILIACI, F. Anaphora resolution in near-native speakers of Italian. *Second Language Research* 22(3), p. 339–368, 2006.

WHITE, L. The Interface Hypothesis: How far does it extend? *Linguistic Approaches to Bilingualism* 1 (1), Amsterdam, p. 108-110, 2011.

YANG, C.; GORDON, P.; HENDRICK, R.; WU, J. Comprehension of Referring Expressions in Chinese. *Language and Cognitive Processes*, 14:5-6, p. 715-743, 1999. DOI: 10.1080/016909699386248

ZHAO, L. X. Ultimate attainment of anaphora resolution in L2 Chinese. *Second Language Research*, 30(3), p. 381-407, 2014.